

What is claimed is:

1. A bar code symbol reading device comprising:

(1) a hand-supportable housing having a light transmission aperture through which visible light can exit and enter said hand-supportable housing;

(2) a laser scanning engine, disposed within said hand supportable housing, that selectively operates in one of first and second scan modes,

wherein in said first scan mode, the laser scanning engine projects an omni-directional scan pattern through said light transmission aperture, detects and decodes bar code symbols on objects passing through said omni-directional scan pattern, and produces symbol character data representative of decoded bar code symbols, and

wherein in said second scan mode the laser scanning engine projects a single line scan pattern through said light transmission aperture and detects and decodes bar code symbols on objects passing through said single line scan pattern, and produces symbol character data representative of decoded bar code symbols,

(3) a manually-activated data transmission switch integrated with said hand-supportable housing, for producing a data transmission activation control signal in response to activation of the data transmission switch;

(4) a data transmission subsystem in said hand-supportable housing that operates under control of control circuitry to communicate the symbol character data produced by the laser scanning engine to a host device operably coupled to said bar code symbol reading device;

(5) said control circuitry enabling communication of symbol character data produced by the laser scanning engine in said second scan mode of operation to said host device upon occurrence of a first set of predetermined conditions including receipt of said data transmission activation control signal produced by said data transmission switch, and said control circuitry disabling communication of symbol character data produced by the laser scanning engine in said

second scan mode of operation to said host device upon occurrence of a second set of predetermined conditions including lack of receipt of said data transmission activation control signal produced by said data transmission switch.

2. The bar code symbol reading device of claim 1, wherein said control circuitry enables communication of symbol character data produced by the laser scanning engine in said first scan mode of operation to said host device irrespective of said data transmission activation control signal produced by said data transmission switch.

3. The bar code symbol reading device of claim 1, further comprising a support stand that supports said hand-supportable housing, and mode selection means integrated with said hand-supportable housing, for selectively operating said laser scanning engine in one of said first and second scan modes in response to placement of said hand-supportable housing in said support stand.

4. The bar code symbol reading device of claim 1, wherein said laser scanning engine comprises:

a bar code symbol presence detection means in said hand-supportable housing for processing scan data so as to detect the presence of said bar code symbol on said object and to automatically generate a first control signal in response to the detection of said bar code symbol; and

decode processing means in said hand-supportable housing for processing scan data so as to decode said bar code symbol on said object and for automatically producing symbol character data representative of said decoded bar code symbol, and automatically generating a second control signal indicative of the production of said symbol character data.

5. The bar code symbol reading device of claim 4, wherein said bar code symbol presence detection means detects said bar code symbol by detecting first and second envelope borders of said bar code symbol.

6. The bar code symbol reading device of claim 4, wherein said first set of predetermined conditions includes receipt of said second control signal and said data transmission activation control signal within respective predetermined time periods, and said second set of predetermined conditions includes receipt of said second control signal and lack of receipt of said data transmission activation control signal within respective predetermined time periods.

7. The bar code symbol reading device of claim 4, wherein said laser scanning engine comprises object detection means in said hand-supportable housing, for detecting said object in at least a portion of an object detection field defined relative to said housing and automatically generating a third control signal indicative of the detection of said object in at least a portion of said object detection field.

8. The bar code symbol reading device of claim 7, further comprising control circuitry that selectively activates said bar code symbol presence detection means and said decode processing means in response to occurrence of said third control signal.

9. The bar code symbol reading device of claim 7, wherein said object detection means comprises:

a signal transmitting means for transmitting a signal towards said object in said object detection field, and

a signal receiving means for receiving said transmitted signal reflected off said object in at least a portion of said object detection field, and automatically generating said third control signal indicative of the detection of said object in at least a portion of said object detection field.

10. The bar code symbol reading device of claim 9, wherein said signal transmitting means comprises an infra-red light source for transmitting a pulsed infra-red light signal, and wherein said signal receiving means comprises an infra-red light detector disposed in said hand-supportable housing.

11. The bar code symbol reading device of claim 9, wherein said signal transmitting means comprises a laser diode for transmitting a pulsed laser signal, and wherein said signal receiving means comprises a photodetector disposed in said hand-supportable housing.

12. The bar code symbol reading device of claim 1, wherein said laser scanning engine comprises a visible laser light source, a scanning element and at least one stationary mirror that cooperate to project said single line scan pattern through said light transmission aperture in said second scan mode.

13. The bar code symbol reading device of claim 1, wherein said laser scanning engine comprises a visible laser light source, a scanning element and a plurality of stationary mirrors that cooperate to project said omni-directional scan pattern through said light transmission aperture in said first scan mode.

14. The bar code symbol reading device of claim 13, wherein said visible laser light source, scanning element and a predetermined subset of said plurality of stationary mirrors of the laser scanning engine cooperate to project said single line scan pattern through said light transmission aperture in said second scan mode.

15. The bar code symbol reading device of claim 14, further comprising control circuitry that operates, in said second scan mode, to control power of said visible laser light produced by said laser light source.

16. The bar code symbol reading device of claim 15, wherein said control circuitry operates, in said second scan mode, to control the duty cycle of said visible laser light to selectively enable said laser light source to produce laser light only when the light produced therefrom is directed by said scanning element onto said predetermined subset of stationary mirrors.

17. The bar code symbol reading device of claim 15, wherein said control circuitry operates, in said second scan mode, to control power of said visible laser light such that: said

laser light source produces normal power laser light when the light produced therefrom is directed by said scanning element onto said predetermined subset of stationary mirrors, and said laser light source produces significantly lower power laser light when the light produced therefrom is not directed by said scanning element onto said predetermined subset of stationary mirrors.

18. The bar code symbol reading device of claim 15, wherein said scanning element comprises a rotating light directing element having a rotation cycle and said control circuitry derives timing signals synchronized to a particular interval in the rotation cycle of said rotating light directing element wherein the rotating light directing element directs light produced from the laser light source onto said predetermined subset of stationary mirrors.

19. The bar code symbol reading device of claim 18, wherein said timing signals are derived from a position sensor integrated into a rotating portion of the rotating light directing element.

20. The bar code symbol reading device of claim 18, wherein said timing signals are derived from a position indicating optical element mounted adjacent (or near) the perimeter of one of said stationary mirrors, such that the position indicating optical element is illuminated by light produced from said laser light source when the rotating light directing element reaches a predetermined point in its rotation.

21. The bar code symbol reading device of claim 20, wherein said position indicating optical element comprises a mirror that directs illumination incident thereon to a position indicating optical detector, which generates an electrical signal whose amplitude corresponds to the intensity of light incident thereon.

22. The bar code symbol reading device of claim 20, wherein said position indicating optical element comprises a light collecting lens that is operably coupled to a light guide to direct illumination incident on the light collecting lens to a position indicating optical detector, which

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generates an electrical signal whose amplitude corresponds to the intensity of light incident thereon.

23. The bar code symbol reading device of claim 22, wherein said light guide comprises a fiber optic bundle.

24. The bar code symbol reading device of claim 15, wherein said control circuitry comprises a 555 timer integrated circuit configured for mono-stable operation.

25. The bar code symbol reading device of claim 1, wherein said laser scanning engine operates in a preprogrammed set of operational states wherethrough the laser scanning engine automatically passes during each bar code symbol reading operation.

26. The bar code symbol reading device of claim 25, wherein the preprogrammed set of operational states include a bar code presence detection state of operation and a bar code symbol reading state of operation.

27. The bar code symbol reading device of claim 26, wherein the preprogrammed set of operational states further include an object detection state of operation.

28. The bar code symbol reading device of claim 27, which further comprises an objection detection subsystem realized using either infrared (IR) signal transmission/receiving technology, or low-power non-visible laser beam signaling technology, for automatically detecting an object within an object detection field defined relative to said hand-supportable housing.

29. The bar code symbol reading device of claim 1, further comprising a set of color-encoded light sources provide on the exterior of said hand-supportable housing for sequentially generating a set of visually-perceptible state indication signals that visually indicate to the user the various states of operation, wherethrough said device automatically passes during each instance of automatic bar code symbol reading in accordance with the present invention.

30. The bar code symbol reading device of claim 3, wherein said device, when placed in said support stand, operates in said first scan mode of operation as a stationary hands-free projection scanner, and wherein said device, when removed from said support stand, operates in said second scan mode of operation as a portable hand-held scanner.

31. A method of transmitting bar code symbol character data to a host computer system, said method comprising the steps of:

controlling a laser scanning engine disposed within a hand-supportable housing to selectively operate in one of first and second scan modes,

wherein in said first scan mode, the laser scanning engine projects an omni-directional scan pattern through a light transmission aperture, detects and decodes bar code symbols on objects passing through said omni-directional scan pattern, and produces symbol character data representative of decoded bar code symbols, and

wherein in said second scan mode the laser scanning engine projects a single line scan pattern through said light transmission aperture and detects and decodes bar code symbols on objects passing through said single line scan pattern, and produces symbol character data representative of decoded bar code symbols,

producing a data transmission activation control signal in response to the manual-actuation of a manually-actuatable data transmission switch;

enabling communication of symbol character data produced by the laser scanning engine in said second scan mode of operation to said host device upon occurrence of a first set of predetermined conditions including receipt of said data transmission activation control signal produced by said data transmission switch;

disabling communication of symbol character data produced by the laser scanning engine in said second scan mode of operation to said host device upon occurrence of a second set of

predetermined conditions including lack of receipt of said data transmission activation control signal produced by said data transmission switch.

32. The method of claim 31, further comprising the step of enabling communication of symbol character data produced by the laser scanning engine in said first scan mode of operation to said host device irrespective of said data transmission activation control signal produced by said data transmission switch.

33. The method of claim 31, wherein the enabling step is performed at least in part by a programmed controller.

34. The method of claim 31, wherein the laser scanning engine is selectively operated in one of said first and second scan modes in response to placement of said hand-supportable housing in a support stand that supports said hand-supportable housing.

35. The method of claim 31, further comprising the step of controlling the laser scanning engine to operate in a preprogrammed set of operational states wherethrough the laser scanning engine automatically passes during each bar code symbol reading operation.

36. The method of claim 35, wherein the preprogrammed set of operational states include a bar code presence detection state of operation and a bar code symbol reading state of operation.

37. The method of claim 36, wherein said laser scanning engine comprises:  
bar code symbol presence detection means for processing scan data so as to detect the presence of said bar code symbol on said object and to automatically generate a first control signal in response to the detection of said bar code symbol; and  
decode processing means in said hand-supportable housing for processing scan data so as to decode said bar code symbol on said object and for automatically producing symbol character data representative of said decoded bar code symbol, and automatically generating a second control signal indicative of the production of said symbol character data.



38. The method of claim 37, wherein said first set of predetermined conditions includes receipt of said second control signal and said data transmission activation control signal within respective predetermined time periods, and said second set of predetermined conditions includes receipt of said second control signal and lack of receipt of said data transmission activation control signal within respective predetermined time periods.

39. The method of claim 36, wherein the preprogrammed set of operational states further include an object detection state of operation.

40. The method of claim 39, wherein the laser scanning engine utilizes either infrared (IR) signal transmission/receiving technology, or low-power non-visible laser beam signaling technology, for automatically detecting an object within an object detection field defined relative to said hand-supportable housing.

41. The method of claim 39, further comprising the step of selectively operating the laser scanning engine in said bar code symbol presence detection state and said bar code symbol reading state in response to operation of the laser scanning engine in said bar code symbol object detection state.

42. The method of claim 31, wherein said laser scanning engine comprises a visible laser light source, a scanning element and at least one stationary mirror that cooperate to project said single line scan pattern through said light transmission aperture in said second scan mode.

43. The method of claim 31, wherein said laser scanning engine comprises a visible laser light source, a scanning element and a plurality of stationary mirrors that cooperate to project said omni-directional scan pattern through said light transmission aperture in said first scan mode.

44. The method of claim 43, wherein said visible laser light source, scanning element and a predetermined subset of said plurality of stationary mirrors of the laser scanning engine

cooperate to project said single line scan pattern through said light transmission aperture in said second scan mode.

45. The method of claim 44, further comprising the step of : in said second scan mode, controlling power of said visible laser light produced by said laser light source.

46. The method of claim 45, wherein, in said second scan mode, the duty cycle of said visible laser light is controlled to selectively enable said laser light source to produce laser light only when the light produced therefrom is directed by said scanning element onto said predetermined subset of stationary mirrors.

47. The method of claim 45, wherein, in said second scan mode, power of said visible laser light is controlled such that: said laser light source produces normal power laser light when the light produced therefrom is directed by said scanning element onto said predetermined subset of stationary mirrors, and said laser light source produces significantly lower power laser light when the light produced therefrom is not directed by said scanning element onto said predetermined subset of stationary mirrors.

48. The method of claim 45, wherein said scanning element comprises a rotating light directing element having a rotation cycle, further comprising the step of deriving timing signals synchronized to a particular interval in the rotation cycle of said rotating light directing element wherein the rotating light directing element directs light produced from the laser light source onto said predetermined subset of stationary mirrors.

49. The method of claim 48, wherein said timing signals are derived from a position sensor integrated into a rotating portion of the rotating light directing element.

50. The method of claim 48, wherein said timing signals are derived from a position indicating optical element mounted adjacent (or near) the perimeter of one of said stationary mirrors, such that the position indicating optical element is illuminated by light produced from

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said laser light source when the rotating light directing element reaches a predetermined point in its rotation.

51. The method of claim 50, wherein said position indicating optical element comprises a mirror that directs illumination incident thereon to a position indicating optical detector, which generates an electrical signal whose amplitude corresponds to the intensity of light incident thereon.

52. The method of claim 50, wherein said position indicating optical element comprises a light collecting lens that is operably coupled to a light guide to direct illumination incident on the light collecting lens to a position indicating optical detector, which generates an electrical signal whose amplitude corresponds to the intensity of light incident thereon.

53. The method of claim 42, wherein said light guide comprises a fiber optic bundle.

54. The method of claim 31, further comprising the step of: controlling a set of color-encoded light sources provided on the exterior of said hand-supportable housing to sequentially generate a set of visually-perceptible state indication signals that visually indicate to the user the various states of operation during each instance of automatic bar code symbol reading in accordance with the present invention.

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